

WHAT IS CLAIMED IS:

1. A method of forming an electronic packaging module, comprising:

securing a first plurality of integrated circuit chips in a first chip stack, wherein the first chip stack comprises a first lateral face wherein the first lateral face comprises a portion of each chip;

securing a second plurality of integrated circuit chips in a second chip stack, wherein the second chip stack comprises a first lateral face wherein the first lateral face comprises a portion of each chip;

bonding the first lateral face of the first chip stack to the first lateral face of the second chip stack so as to form a single module;

electrically interconnecting the module to a bonding substrate, wherein the bonding substrate comprises external circuitry.

2. The method of Claim 1, further comprising:

enclosing said module inside an enclosure;

introducing a thermally conductive fluid to said enclosure, said thermally conductive fluid has a thermal conductivity greater than that of air at one atmosphere, wherein said thermally conductive fluid contacts the chip stacks and transfers heat therefrom.

3. The method of Claim 2, wherein introducing said thermally conductive fluid into said enclosure comprises introducing a gas mixture comprising helium and hydrogen.

4. The method of Claim 3, wherein said gas mixture is at a pressure higher than pressure external to the enclosure.

5. The method of Claim 1, wherein securing the first chips in the first chip stack comprises securing one or more chip substrates in a stack in a manner such that a plurality of openings are formed between two adjacent chip substrates in a manner so as to permit a fluid to circulate in a region between the substrates, thereby providing cooling for the chip stack.

6. The method of Claim 1, wherein securing the first chips in the first chip stack comprises securing one or more chip structures having a plurality of air bridge structures formed on a substrate of the chip, wherein said air bridge structures are stabilized and supported by a temporary support material.

7. The method of Claim 6, further comprising removing the temporary support material stack after electrically connecting the module to the bonding substrate.
8. The method of Claim 6, further comprising removing the temporary support material after bonding the first chip stack to the second chip stack.
9. A method of forming an electronic packaging module, comprising:
 - securing a plurality of integrated circuit chips so as to form a chip stick;
 - enclosing the chip stack inside an enclosure;
 - introducing a thermally conductive fluid to the enclosure, the thermally conductive fluid has a thermal conductivity greater than that of air at one atmosphere, wherein the thermally conductive fluid contacts the chip stack and transfers heat therefrom.
10. The method of Claim 9, wherein the thermally conductive fluid comprises a gas mixture.
11. The method of Claim 10, where the gas mixture comprises helium and nitrogen.
12. The method of Claim 9, further comprising pressuring the thermally conductive fluid.
13. The method of Claim 12, wherein pressurizing the thermally conductive fluid comprises pressurizing the fluid to between about 5 MPa and 50 MPa.